

REMARKS

Applicants respectfully request reconsideration of the rejections set forth in the Office Action mailed on July 16, 2002. Claims 49-61 and 63-65 have been rejected. Claims 58 and 59 have been cancelled herein. Claim 66 has been added. Claims 49-57, 60, 61, and 63-66 are now pending.

Claim amendments were made to better define one embodiment of the invention, notwithstanding the Applicants' belief that the unamended claims would have been allowable, without acquiescing to any of the Examiner's arguments, and without waiving the right to prosecute the unamended (or similar) claims in another application, for the purpose of furthering Applicants' business goals and expediting the patent application process in a manner consistent with the PTO's Patent Business Goals. None of the amendments to the claims is related to the statutory requirements of patentability unless expressly stated so herein.

A clean version of the amended claims with instructions for entry pursuant to 37 C.F.R. §1.121(c)(1)(i) is included above. A marked-up version of the amended claims pursuant to 37 C.F.R. §1.121(c)(1)(ii) is attached as Appendix I. The comments in the Office action are now addressed in turn.

Rejections under 35 U.S.C. § 112

The Examiner has rejected Claims 49 – 61 under 35 U.S.C. §112, first paragraph, as containing subject matter which was not described in the specification in such a way as to reasonably convey to one skilled in the relevant art that the inventor(s) at the time the application was filed had possession of the claimed invention. More specifically, the Examiner maintains that there is no basis for the limitation “comparing features” in claim 49.

Applicants believe that there is sufficient basis for the limitation. For example, the specification states that “in a step 293, reduced features of step 291 can be compared”. However, to address the Examiner's concerns and to expedite prosecution of this application, Applicants have amended Claim 49 to replace “compare” with “combine”. The Examiner is therefore respectfully requested to remove the 35 U.S.C. § 112, first paragraph, rejection of the above claims.

Rejections under 35 U.S.C. § 103

Claims 49-61 and 63-65 have been rejected under 35 U.S.C. §103(a) as being unpatentable over Biodx, Weaver et. al., Pauwels, and Weinstein or Biodx, Pauwels and Weinstein or Biodx, Singhvi, Pauwels, and Weinstein and further in view of Sundblad et. al. (J. Exp. Botany, 1998). This rejection is respectfully traversed as applied to the amended claims.

Biodx describes a computer-implemented method for

“performing high-throughput screening of the physiological response of cells to biologically active compounds and methods of combining high-throughput with high content spatial information at the cellular and sub-cellular level as well as temporal information about changes in physiological, biochemical, and molecular activities”. (at Abstract)

To accomplish the desired high-throughput screening, Biodx relies upon combination of “multi-color luminescence reading, microfluidic delivery, and environmental control of living cells in non-uniform micro-patterned arrays” (at page 12, lines 7 – 8) that provides for “high throughput and high content screening of the physiological response of cells to biologically active compounds...”. More specifically, at page 37, lines 15 – 23, an algorithm for analyzing a non-uniform micro-patterned array of cells in both the high throughput and high content modes is described. This algorithm first uses the high throughput detection to measure a response from the entire array “A”. In the high content mode, any cells in a “hit” well are measured via high content screening which may or may not measure the same cell parameter as during the high throughput mode. In either case, the optical information is converted into digital data which is then used to determine the distribution, environment or activity of the labeled reporter molecules in the cells.

In contrast to the invention as recited in claim 49, as amended, Biodx does not teach or suggest any methods for combining a plurality of features of a plurality of cells of more than one cell type. Nor does Biodx teach or suggest any methods for deriving descriptors by multidimensional statistical analysis to determine specific properties of a particular manipulation.

The teachings of Biodx, Weaver, Singhvi, and Pauwels have been discussed previously. The Examiner admits that none of these references teach or suggest the use of principal component analysis to analyze the images of the manipulated cells. As such, the Examiner has cited Sundblad. However, Sundblad does not rectify the deficiency of the primary reference.

None of the cited references, either alone or in combination, teach or suggest the combining of data from a plurality of components of a plurality of cells of a plurality of different cell types.

Finally, the Examiner also states that the technique of PCA is a standard multivariate analysis tool that is commonly used for image analysis. Applicants agree that PCA is a standard analysis tool. Applicants maintain, however, that its application to the analysis of cellular images is not commonly known to those of skill in the art. Indeed, Sunblad teaches that an automatic classification of nuclei based upon image analysis is impossible, even with PCA (at 1755, column 2 first paragraph).

The Examiner has not provided any evidence to support her assertions that PCA is a standard tool commonly used for analysis of images of cells. Applicants thus would direct the Examiner's attention to 37 C.F.R. §1.104(d)(2) which states:

When a rejection in an application is based on facts within the personal knowledge of an employee of the Office, the data shall be specific as possible, and the rejection must be supported, when called for by the applicant, by the affidavit of such employee, and such affidavit shall be subject to contradiction or explanation by the affidavit of the applicant and other persons.

Applicants invite the Examiner to provide an affidavit supporting these assertions. Accordingly, Applicants believe that Biodx taken singly or with any combination of the cited references neither teaches nor reasonably suggests the invention as claimed herein. Applicants respectfully request that the rejections be withdrawn.

Conclusion

The Applicant respectfully maintains that all pending claims are in condition for allowance. Therefore, the Applicant respectfully requests a Notice of Allowance for this Application from the Examiner. Should any unresolved issues remain, the Examiner is encouraged to contact the undersigned at the telephone number provided below.

Respectfully submitted,
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MARKED UP VERSION OF AMENDED CLAIMS

49. (Four Times Amended) A computer program product for determining a property of a manipulation based upon determination of effects of said manipulation on **[at least two of a plurality of components of at least one of a plurality of cells,] a plurality of different cell types,** said computer program product comprising:

code for receiving one or more images of **[at least two of] a plurality of components of [at least one of] a plurality of cells, wherein said plurality of cells are of different cell types and wherein said plurality of cells [that] have been exposed to the manipulation[, wherein said manipulation is selected from the group consisting of applying a hormone, applying a growth factor, applying an extracellular matrix component, applying a virus, applying an electroporation, applying an antisense polynucleotide, applying a gene knock-out, applying a gene overexpression, applying a gene mutation, applying a cell fusion, and combinations thereof];**

code for determining **[at least one of] a plurality of features of a first component of said [at least two of a] plurality of components and [at least one of] a plurality of features of a second component of said [at least two of a] plurality of components;**

code for **[determining a plurality of descriptors, wherein said code for determining a plurality of descriptors comprises] combining a plurality of features of said first component with a plurality of features of said second component to yield a plurality of descriptors;**

code for performing principal component analysis on said plurality of descriptors[, wherein said descriptors comprise at least one said plurality of features of said first component or at least one of a plurality of features of said second component and wherein at least one of said plurality of descriptors is formed by comparing features of said first component and said second component];

[code for searching a plurality of descriptors obtained from a database to locate descriptors related to at least one based upon one of said descriptors of said manipulation, said searching forming a plurality of located descriptors;]

code for determining[, based upon said located descriptors,]properties of said manipulation based upon said analysis [located descriptors]; and

a computer readable storage medium for holding the codes.

51. (Amended) The computer program product of claim 49 wherein said [code for providing a] manipulation [further] comprises [code for] applying a chemical factor.

52. (Amended) The computer program product of claim 49 wherein said [properties] property comprises toxicity.

53. (Amended) The computer program product of claim 49 wherein said [properties] property comprises a mechanism of action.

54. (Amended) The computer program product of claim 49 wherein said [properties] property comprises at least one of a plurality of pharmacological properties.

56. (Twice Amended) A computer program product comprising a machine readable medium on which is provided program instructions for determining an effect of a manipulation on a plurality of cells of different cell types, the instructions comprising:

[code for receiving one or more images of at least one of the plurality of cells that have been exposed to the manipulation]

code for receiving one or more images of a plurality of components of a plurality of cells, wherein said plurality of cells are of different cell types and wherein said plurality of cells have been exposed to the manipulation;

[code for determining, from the one or more images, a first descriptor for a first component of at least one of the plurality of cells and a second descriptor for a second component of at least one of the plurality of cells]

code for determining a plurality of features of a first component of said plurality of components and a plurality of features of a second component of said plurality of components;

code for combining at least one of a plurality of features of said first component with at least one of a plurality of features of said second component; and

code for performing statistical analysis on said plurality of features wherein said statistical analysis comprises multidimensional representations, principal component analysis, or frequency based representations on at least said combined features

[code for analyzing the first and second descriptors] to determine the effect of the manipulation on the plurality of cells[,

wherein said descriptors comprise numeric or logical values].

63. (Three Times Amended) A computer program product comprising a machine readable medium on which is provided program instructions for predicting properties of a chemical compound based on information about effects of at least one of a plurality of known compounds [on one or more cell populations] on a plurality of cells of different cell types, the instructions comprising:

code for receiving one or more images of a plurality of components of a [the at least one of a] plurality of cells of different cell types that have been exposed to the chemical compound;

code for determining, from the one or more images, multiple descriptors for multiple components of [at least one of] the plurality of cells of said different cell lines, wherein said code for determining a multiple descriptors comprises code for performing principal component analysis on the said multiple descriptors;

code for determining a relationship between said descriptors of said chemical compound with other descriptors of said known compounds; and

code for making an inference about said chemical compound based upon said other descriptors,

wherein said descriptors and other descriptors comprise numeric or logical values.